

# An Overview of Gestational Diabetes Mellitus in Utah

Gestational diabetes mellitus (GDM) is emerging as a serious public health problem. Approximately three to five percent of all pregnancies in the U.S. are affected by gestational diabetes.<sup>1-2</sup> In Utah, the prevalence of gestational diabetes has been steadily increasing in recent years. The current rate, 2.3 percent, although lower than the nation at large, nonetheless yields a substantial number of cases (1,109 cases in 2001).<sup>3</sup>

Early identification of gestational diabetes during pregnancy may reduce the risk of adverse birth outcomes and increase the likelihood that glucose levels might be managed through diet and exercise, and therefore eliminate the need for medications. The Healthy People 2010 Report included a developmental objective specifically devoted to gestational diabetes (HP2010 Objective 5-8). The inclusion of this objective as a national goal highlights the recent interest in decreasing the proportion of pregnant women with gestational diabetes.

While prenatal care is immeasurably important for women with either pre-existing or gestational diabetes, this report focuses on gestational diabetes. Data for this report

were drawn from the database of live birth records housed at the Office of Vital Records and Statistics, Utah Department of Health. Assessing trends in gestational diabetes and evaluating its impact are important components of comprehensive diabetes surveillance.

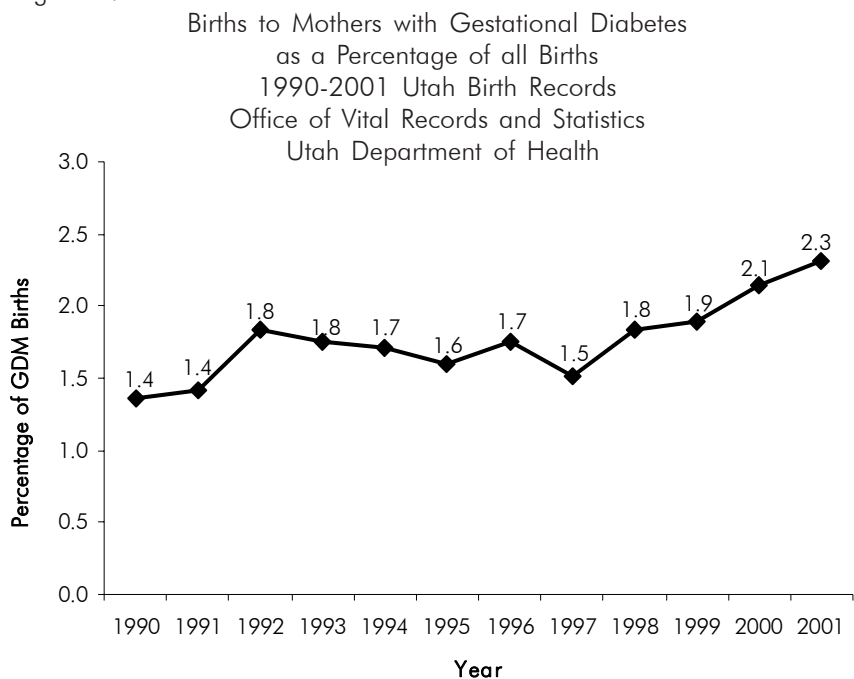
Gestational diabetes is broadly defined as insulin resistance or carbohydrate intolerance that is first identified during pregnancy and disappears after delivery. The risk factors for gestational diabetes are similar

to those for type 2 diabetes and include advancing age, being overweight or obese, and being a member of a minority racial or ethnic group.<sup>4</sup> Increasing parity (defined, for this report, as number of live births) is an additional risk factor for gestational diabetes.<sup>5-7</sup>

## Healthy People 2010 Objective 5-8:

Decrease the proportion  
of pregnant women  
with gestational diabetes.

Figure 1.



Prior to 1997, a single check box on the birth certificate was used to denote diabetes during pregnancy, but pre-existing diabetes and gestational diabetes were not differentiated. In 1997, the original check box for diabetes was eliminated and replaced with two check boxes to distinguish between pre-existing diabetes and GDM were added. In this figure, rates of GDM prior to 1997 were estimated by applying the proportion of GDM/diabetes births.

## Risk Factors and Gestational Diabetes Among Utah Mothers

Exploring variations in risk factors for gestational diabetes by subgroups provides useful information for developing interventions for specific populations. Data from the 2001 birth records show a clear pattern in the percentages of Utah mothers with gestational diabetes and the presence of selected risk factors (Table 1). Only 1.3 percent of birth records for mothers less than age 25 listed gestational diabetes. This percentage doubled to 2.6 percent for mothers between the ages of 25 and 34, redoubling to 5.3 percent for mothers age 35 years

and over. This positive association is also apparent for pre-pregnancy weight status. Approximately 1.4 percent of birth records for mothers who were not overweight (defined as pre-pregnancy body mass index [BMI] of less than 25) listed gestational diabetes, increasing to about three percent for mothers who were moderately overweight (defined as pre-pregnancy BMI of 25 to 29.9). Six percent of birth records for obese mothers (pre-pregnancy BMI greater than 30) listed gestational diabetes, twice that of birth records for mothers who were moderately overweight, and

four times that for mothers with normal weight. There was virtually no difference in rates of gestational diabetes for mothers in urban and rural areas (2.3% vs. 2.4%). The relationship between parity (live births) and risk of gestational diabetes parallels that of age and weight. The higher the parity, the greater the likelihood the mother would have gestational diabetes. Less than one of 50 births for first-time mothers indicated gestational diabetes, compared to one of 20 births to mothers who had had seven or more children (5.3%).

**Table 1.**  
Numbers and Percentages of Births to Mothers with Gestational Diabetes by Selected Risk Factors  
Utah Office of Vital Records and Statistics Birth Records 2001

Risk Factor	Total Number of Pregnancies	Percentage of Pregnancies with Gestational Diabetes
Overall	47,399	2.3
<b>Age</b>		
Less than 25	19,448	1.3
25-34	23,805	2.6
35 and over	4,126	5.3
<b>Pre-pregnancy Weight Status</b>		
Not overweight (BMI <25)	31,795	1.4
Moderately overweight (BMI 25-29.9)	9,325	2.9
Obese (BMI of 30+)	6,279	5.8
<b>Location</b>		
Urban*	36,866	2.3
Rural	10,533	2.4
<b>Children Born**</b>		
First	50,588	1.5
Second	40,942	2.0
Third	25,508	2.3
Fourth	13,096	3.1
Fifth	5,570	3.7
Sixth	2,199	4.3
Seventh and Higher	2,056	5.3

\* Urban includes deliveries for mothers who are residents of Davis, Salt Lake, Utah, or Weber Counties.

\*\* For this report, parity is defined as the number of live births.

Note: Categories are not mutually exclusive, and the presence of one risk factor may be linked to other risk factors. For example, a mother with high parity is likely to be older than a mother with lower parity.

## Race/Ethnicity and Gestational Diabetes Among Utah Mothers

Past studies indicate that some racial and ethnic groups have rates of gestational diabetes as high as 14 percent.<sup>8</sup> Therefore, this report examines the relationship between race/ethnicity and risk of gestational diabetes. Since some groups have few cases, three years of data (1999-2001) were combined for the analysis. The average number of births per year for the three-year period are shown (Table 2).

The overall rate of Utah births with gestational diabetes was 2.1% over the three-year period. The greater risks for mothers who are members of certain racial and ethnic minority groups are well established. Contrary to

the norm, however, African American Utah mothers exhibited the lowest rates of gestational diabetes, only 1.6 percent of births. This percentage was followed closely by births to non-Hispanic/Latina White Utah mothers (1.9 percent of births). Births for Asian American mothers (i.e., Japanese and Chinese) exhibited rates of gestational diabetes higher than the Utah average, 2.2 percent. Hispanic/Latina births had higher rates of gestational diabetes than the state, at 2.8 percent. Records for Pacific Islander and other Asian mothers (e.g., Samoan, Filipina, and other islanders) indicated that 3.4 percent of mothers had gestational diabetes. The highest

percentage of gestational diabetes across race/ethnicity was observed among records for Native American mothers, with over five percent (5.2%) complicated by gestational diabetes. This high prevalence rate has also been observed among Native American groups in other locations.<sup>9</sup>



**Table 2.**

**Average Annual Numbers and Percentages of Births to Mothers with Gestational Diabetes by Race/Ethnicity and Selected Risk Factors**  
Utah Office of Vital Records and Statistics Birth Records 1999- 2001

	Average Number of Births Per Year	Percentage with Gestational Diabetes
All Groups	46, 820	2.1
African American	295	1.6
Non-Hispanic/Latina White	38,471	1.9
Hispanic/Latina White	2,150	2.9
Hispanic/Latina Other	74	2.7
Native American	649	5.2
Pacific Islander*	1,122	3.4
Asian American**	213	2.4
Other Race ***	33	3.0
<p>* Includes Pacific Islander, Hawaiian, Filipina, unspecified Asian  ** Includes Chinese, Japanese  *** Other race includes some mothers with Hispanic/Latina ethnicity</p>		

## Hispanic/Latina Utah Mothers and Risk Factors for Gestational Diabetes

Approximately 13 percent of all Utah births, about 6,000 a year, are to mothers with Hispanic/Latina ethnicity. Of these births to Hispanic/Latina mothers, about two-thirds are to Hispanic/Latina mothers who were born outside of the U.S. (See Figure 2). Because of this high proportion of Hispanic/Latina mothers born outside of the U.S., this section of the report focuses on the relationship between place of birth for Hispanic/Latina mothers and prevalence of gestational diabetes. In addition, assessment is especially warranted since those born outside of the U.S. may have less access to health care and information than those born in the U.S.

The overall rate of gestational diabetes for births to Hispanic/Latina mothers for years 1999 to 2001 was 2.8 percent (Table 3). The rate of gestational diabetes for births to Hispanic/Latina mothers born in Mexico was greater than for their counterparts born in the U.S. (3.3% vs. 2.3%). However, there was virtually no

difference in the rate for mothers born in a location outside of the U.S., other than Mexico, than for mothers born in the U.S. (2.3% vs. 2.2%).

Interestingly, mothers born in Mexico tended to be older than U.S.-born mothers Hispanic/Latina mothers (25.6 vs. 23.7 average years of age), which could partially explain their relatively higher rate of gestational diabetes vis-à-vis their U.S.-born counterparts, despite their lower prevalence of obesity. In a similar vein, the relatively lower

prevalence of obesity among mothers born in a non-U.S. location, other than Mexico (8.9% vs. 17.1%), is offset by their relatively higher average age, thereby resulting in the negligible difference in the rate of gestational diabetes between these mothers and their counterparts in the U.S.

There was virtually no variation in parity among the groups; thus, parity would not be expected to play a key role explaining observed differences in birth locations of mother.

Figure 2.

Percentage Distribution by Place of Birth for Hispanic/Latina Mothers Giving Birth in Utah  
Utah Birth Records 1999-2001

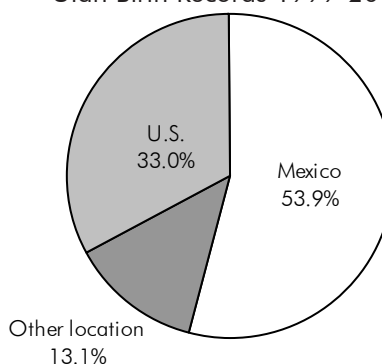


Table 3.

Characteristics of Utah Hispanic/Latina Mothers Born in U.S., Mexico, and Other Locations  
Utah Office of Vital Records and Statistics  
Utah Birth Records 1999- 2001

	Born in U.S.	Born in Mexico	Born Elsewhere	Total birth records for Hispanic/Latina mothers 1999-2001
Average number of pregnancies per year	1,965	3,214	783	5,959*
Percentage with gestational diabetes	2.2	3.3	2.3	2.8
Percentage with pre-pregnancy weight status				
Not overweight (%)	62.2	66.8	70.4	65.7
Moderately overweight (%)	20.8	23.1	20.7	22.0
Obese (%)	17.1	10.1	8.9	12.2
Average parity listed on birth records	1.5	1.5	1.5	1.5
Average age of mother	23.7	25.6	28.0	25.3

\* Numbers in columns may not add to total due to missing cases

## Birth Outcomes

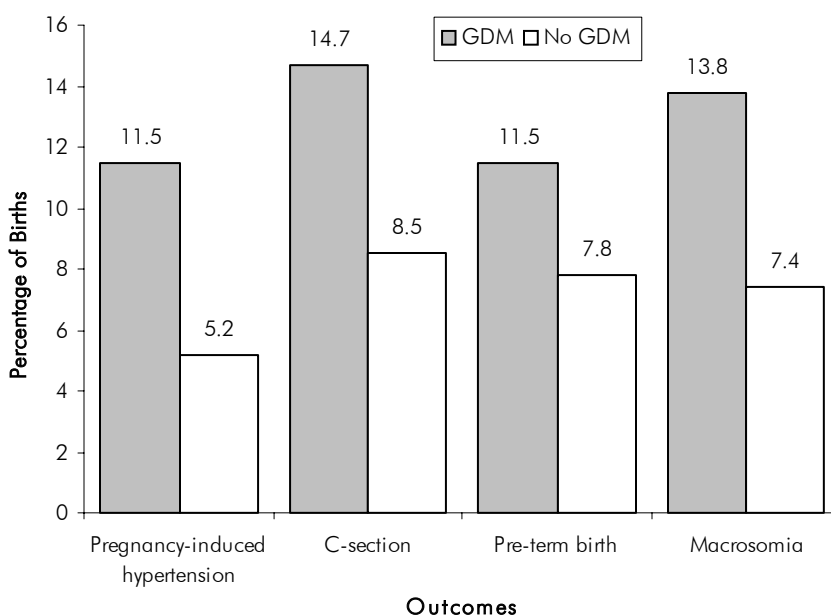
It is difficult to determine how many adverse pregnancy outcomes are independently due to gestational diabetes or due to factors associated with gestational diabetes. For example, obesity is an independent risk factor for many of the same adverse outcomes as gestational diabetes. Nevertheless, there is a strong link between gestational diabetes and less optimal pregnancy outcomes.<sup>10-15</sup> The most pronounced differences in outcomes for mothers with and without gestational diabetes in this study time frame are shown in Figure 3 (For this part of the analysis, only singleton births were used to eliminate outcomes that could have been directly attributable to multiple births).

Mothers with gestational diabetes were over twice as likely to have pregnancy-induced hypertension as mothers without gestational diabetes (11.5% vs. 5.2%). They also had one and three-quarters times the risk of having a Cesarean-section (limited here to primary C-sections) delivery (14.7% vs. 8.5%). Mothers in Utah

with gestational diabetes were close to one and one-half times as likely to have a pre-term birth (11.5% vs. 7.8%). Infants born to mothers with gestational diabetes were substantially more likely to be macrosomic (weigh more than 4,000 grams) (13.8% vs. 7.4%). Mothers with gestational diabetes were no more likely to have offspring with low birth weights

than those without gestational diabetes; nevertheless, low birth weight has been shown to be an independent risk factor of developing diabetes later in life.<sup>16</sup> Within the subgroup of mothers who had gestational diabetes, the highest prevalence level is observed for C-section, followed by macrosomia and pregnancy-induced hypertension.

Figure 3.  
Percentage of Singleton Births with Selected Outcomes  
for Mothers with and without Gestational Diabetes  
Utah Birth Records 1999-2001



## Long-Term Outcomes

Recent research has emphasized the long-term consequences of gestational diabetes for both mothers and infants.<sup>17</sup> About 40 percent of all women diagnosed with gestational diabetes will develop diabetes within 20 years of their pregnancies.<sup>1</sup> Infants born to mothers with diabetes (gestational as well as pre-existing) during pregnancy tend to have

compromised beta cells, making these offspring more vulnerable to

developing diabetes and probably obesity during childhood.<sup>1</sup>

**"The offspring of mothers who had diabetes during pregnancy experience an unusually high rate of type 2 diabetes and obesity in later life . . .".<sup>1</sup>**

## Screening for Gestational Diabetes

Late entry into prenatal care increases the risk of late diagnosis of gestational diabetes for affected mothers.<sup>18-19</sup> Women exhibiting the risk factors for gestational diabetes (e.g., obesity, history of prior gestational diabetes, glycosuria, or family history of diabetes) should be tested as early as possible. Considerable harm to both

mothers and unborn infants may occur before gestational diabetes is even identified. Just over 80 percent of all Utah mothers enter into prenatal care during the first trimester of pregnancy.

Mothers with gestational diabetes were no more likely to enter into prenatal care after the first trimester than those not

diagnosed with gestational diabetes (Table 4).

Women with risk factors for gestational diabetes should be tested as early as possible.

**Table 4.**  
Percentage Distribution of Trimester of Entry into Prenatal Care Among Utah Mothers: Total, With, and Without Gestational Diabetes for All Live-Birth Deliveries  
Utah Birth Records 2001

Entry into Prenatal Care	With Gestational Diabetes	Percentage Distribution	Without Gestational Diabetes	Percentage Distribution	All Pregnancies	Percentage Distribution
First Trimester	901	82.5	37,046	80.0	37,947	80.1
Second Trimester	149	13.6	7,313	15.8	7,462	15.7
Third Trimester	42	3.9	1,948	4.2	1,990	4.2
Total*	1,092	100.0	46,307	100.0	46,307	100.0

\*Not all records listed month of entry into prenatal care

## Criteria for Screening

There is an ongoing debate whether women should be universally screened or whether only those with certain risk factors should be screened. The American Diabetes Association (ADA) and the American College of Obstetrics and Gynecology (ACOG) have somewhat different recommendations for screening and diagnosing women with low, average, and high risk. The ADA recommends universal screening for all women who are of average risk and above by 24 to

28 weeks gestation.<sup>18</sup> ACOG, on the other hand, recommends that only women with certain risk factors be screened.<sup>19</sup>

Women meeting all of the following criteria may not need to be tested:

- Member of an ethnic group with known low prevalence of gestational diabetes
- Normal weight prior to pregnancy
- Less than 25 years of age
- No known history of diabetes in first-degree relative

- No history of abnormal glucose tolerance
- No history of poor obstetric outcome



## Clinical Diagnosis of Gestational Diabetes

Screening traditionally involves using the “two-step approach,” with a one-hour 50gram glucose challenge. Women who test greater than 140mg/dl will then go on to do the diagnostic three-hour oral glucose tolerance test. If two of the four values for the three-hour glucose tolerance test are out of range, the woman would then be diagnosed with gestational diabetes.

### Diagnostic Criteria for Gestational Diabetes:

A fasting plasma glucose >126 mg/dl or casual plasma glucose >200 mg/dl confirms the mother has diabetes.

Methods used to determine presence of gestational diabetes generally use either of the two approaches below:

- A. One-Step: Oral glucose tolerance test alone
- B. Two-Steps: Conduct an initial screening using 50-g oral glucose load and conduct oral glucose tolerance test on women with levels >140 mg/dl

## Resources

The American College of Obstetricians and Gynecologists [www.acog.org](http://www.acog.org)

“Recommendations for Screening for Gestational Diabetes Mellitus.” U. S. Preventive Services Task Force (USPSTF) Recommendations and Rationale for Screening for Gestational Diabetes Mellitus” <http://www.ahrq.gov/clinic/3rduspstf/gdm/gdmrr.htm>

*Understanding Gestational Diabetes: A Practical Guide to a Healthy Pregnancy.* National Institutes of Health, National Institute of Child Health and Human Development. U.S. Department of Health and Human Services. NIH Publication No. 93-2788 (reprinted February 1993) Bulk copies may be ordered through HHS.

“National Diabetes Statistics.” National Diabetes Information Clearinghouse (NDIC): A Service of the National Institute of Diabetes and Digestive and Kidney Diseases, NIDDK, NIH. <http://diabetes.niddk.nih.gov/dm/pubs/statistics/index.htm>

“Gestational Diabetes Mellitus.” 2003. American Diabetes Association Position Statement. *Diabetes Care* 26 (1): S103-S105

Prevalence of Gestational Diabetes Mellitus Detected by the National Diabetes Data Group or the Carpenter and Coustan Plasma Glucose Thresholds Gestational Diabetes Mellitus. 2002. *Diabetes Care* 25: 1625-1630 2002

The Prevention and Treatment of Complications of Diabetes Mellitus: A Guide for Primary Care Practitioners (Adverse Outcomes of Pregnancy) <http://www.cdc.gov/diabetes/pubs/complications/pregnancy.htm>

For more information, contact the Utah Diabetes Prevention and Control Program, 801-538-6141 or visit the website: <http://health.utah.gov/diabetes>

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